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### REMARKS

Applicants concurrently file herewith a petition (and fee) for one-month extension of time.

Entry of this Amendment is proper because it narrows the issues on appeal and does not require further search by the Examiner.

Claims 1, 2, and 4-21 are pending in this Application. Applicants have editorially amended claims 6, 8, and 18. No new matter is added.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1, 2, and 4-21 stand rejected under 35 U.S.C. §102(b) as being anticipated by Ichinose et al. (US 2004/0007708, hereinafter "Ichinose"). Claims 1, 2, 4-6, 8, 14, 19, and 21 stand rejected under 35 U.S.C. §102(b) as being anticipated by Itoh et al. (US Patent 6,218,207, hereinafter "Itoh"). Claims 7, 9, 10, 12, 15-18, and 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Itoh in view of Ota (US 2003/017098, hereinafter "Ota"). Claims 11 and 13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Itoh in view of Braddock (US Patent 6,989,556).

Applicants respectfully traverse these rejections in the following discussion.

#### I. THE CLAIMED INVENTION

The claimed invention (e.g., as defined by exemplary claim 1) is directed to a semiconductor layer.

The semiconductor layer includes a first layer including a Ga<sub>2</sub>O<sub>3</sub> system single crystal substrate, and a second layer obtained by replacing a part rather than all of oxygen atoms of the first layer with nitrogen atoms.

In a conventional semiconductor layer, as described in the Background of the present Application, semiconductor layer includes an Al<sub>2</sub>O<sub>3</sub> substrate made of Al<sub>2</sub>O<sub>3</sub>, an AlN layer, which is formed on a surface of the Al<sub>2</sub>O<sub>3</sub> substrate, and a GaN growth layer which is formed on the AlN layer through epitaxial growth (e.g., see Application at page 1, lines 15-19).

By applying the conventional semiconductor layer, the lattice constants of the AlN

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layer and the GaN growth layer cannot be perfectly made match each other, and thus it is difficult to further enhance crystal quality of the GaN growth layer. In addition, when the conventional semiconductor layer is applied to a light emitting element, crystalline of a luminous layer is degraded, and luminous efficiency is reduced (e.g., see Application at page 2, lines 2-9).

The claimed invention, however, provides a semiconductor layer, in which a first layer including a Ga<sub>2</sub>O<sub>3</sub> system single crystal substrate, and the second layer is obtained by replacing a part rather than all of oxygen atoms of the first layer with nitrogen atoms. (e.g., see Application at page 2, lines 15-20).

These features are important because the second layer which has the GaN system compound semiconductor with high crystalline is obtained without interposing a buffer layer. Hence, when the GaN system epitaxial layer is formed on the second layer, the lattice constants of the second layer and the GaN system epitaxial layer can match each other, and thus the GaN system epitaxial layer having the high crystal quality can be obtained (e.g., see Application at page 12, lines 1-13).

## II. THE PRIOR ART REJECTION

### A. The Ichinose Reference

The Examiner alleges that Ichinose anticipates claims 1, 2, and 4-21. Applicants respectfully submit, however, that the alleged reference does not teach or suggest each and every feature of the claimed invention.

That is, Ichinose does not teach or suggest, *"a second layer obtained by replacing a part rather than all of oxygen atoms of the first layer with nitrogen atoms,"* (emphasis added by Applicants) as recited in claim 1, and similarly recited in claim 21.

The Examiner alleges that Ichinose teaches the claimed semiconductor layer. Specifically, the Examiner bases his rejection upon paragraphs [0038] – [0096] of Ichinose and alleges that the reference teaches the claimed second layer. The Examiner, however, is clearly incorrect.

Ichinose teaches a light emitting element that has a gallium oxide substrate and a p-n junction on the substrate (Fig. 7). Ichinose, however, in paragraphs [0038] – [0096], upon which the Examiner based the rejection (or anywhere else, for that matter), is silent about, and fails to teach or suggest, a second layer is obtained by replacing a part rather than all of

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oxygen atoms of the first layer with nitrogen atoms. Thus, Ichinose fails to satisfy the plain meaning of claim language.

Furthermore, Applicants submit that the Examiner has merely paraphrased the device of Ichinose (e.g., see Office Action at page 3, lines 1-2). The Examiner has not explained the connection between the teachings of Ichinose and the claimed feature.

Accordingly, Applicants request the Examiner to provide an explanation of how the teachings of Ichinose apply to this feature of the claimed invention. That is, the Examiner is specifically requested, instead of vaguely referring to 57 paragraphs of Ichinose (e.g., see Office Action at page 3, lines 1-2), to point out the features of Ichinose (including reference number and specific passage) that the Examiner is analogizing to this feature of the claimed invention.

Moreover, Applicants submit that Ichinose does not teach or suggest, "*a third layer comprising a GaN system epitaxial layer grown on the second layer,*" (emphasis added by Applicants) as recited in claim 6, and similarly recited in claims 8 and 18.

The Examiner bases his rejection upon paragraphs [0038] – [0096] of Ichinose and alleges that the reference teaches the claimed epitaxial layer. The Examiner, however, is clearly incorrect.

Applicants submit that Ichinose in paragraphs [0038] – [0096], upon which the Examiner based the rejection (or anywhere else, for that matter), is silent about, and fails to teach or suggest, a GaN epitaxial layer, as recited in claims 6, 8, and 18.

Indeed, the only place that Ichinose refers to an epitaxial layer is paragraph [0007] of the alleged reference, in which Ichinose teaches a SiC epitaxial layer. SiC is not GaN, which is recited in the claimed invention. Thus, Ichinose fails to satisfy the plain meaning of claim language.

Furthermore, Applicants submit that the Examiner has merely paraphrased the device of Ichinose (e.g., see Office Action at page 3, lines 16-17). The Examiner has not explained the connection between the teachings of Ichinose and the claimed feature.

Accordingly, Applicants request the Examiner to provide an explanation of how the teachings of Ichinose apply to this feature of the claimed invention. That is, the Examiner is specifically requested, instead of vaguely referring to 57 paragraphs of Ichinose (e.g., see Office Action at page 3, lines 16-17), to point out the features of Ichinose (including reference number and specific passage) that the Examiner is analogizing to this feature of the

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claimed invention.

Indeed, Ichinose fails to teach or suggest the claimed structure since Ichinose addresses a different problem.

Therefore, Applicants respectfully submit that Ichinose fails to teach or suggest each element of Applicant's claimed invention. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

#### **B. The Itoh Reference**

The Examiner alleges that Itoh anticipates claims 1, 2, 4-6, 8, 14, 19, and 21. Applicants respectfully submit, however, that the alleged reference does not teach or suggest each and every feature of the claimed invention.

That is, Itoh does not teach or suggest, "*a first layer comprising a Ga<sub>2</sub>O<sub>3</sub> system single crystal substrate,*" (emphasis added by Applicants) as recited in claim 1, and similarly recited in claim 6, 8, and 21.

The Examiner alleges that Itoh teaches the claimed semiconductor layer. Specifically, the Examiner bases his rejection upon columns 5-7 of Itoh and alleges that the reference teaches the claimed first layer. The Examiner, however, is clearly incorrect.

Itoh teaches that the alleged substrate 22 may include insulator single crystals of sapphire, spinel, magnesium oxide, zinc oxide, chromium oxide, lithium niobium oxide, lithium tantalum oxide or lithium gallium oxide, etc. (col. 5, lines 37-48). Itoh, however, in columns 5-7, upon which the Examiner based the rejection (or anywhere else, for that matter), is silent about, and fails to teach or suggest, that the alleged layer 22 includes a Ga<sub>2</sub>O<sub>3</sub> system single crystal substrate. Thus, Itoh fails to satisfy the plain meaning of claim language.

Moreover, Applicants submit that Itoh does not teach or suggest, "*a third layer comprising a GaN system epitaxial layer grown on the second layer,*" (emphasis added by Applicants) as recited in claim 6, and similarly recited in claim 8.

The Examiner bases his rejection upon columns 5-7 of Itoh and alleges that the reference teaches the claimed epitaxial layer. The Examiner, however, is clearly incorrect.

Indeed, Itoh teaches that the alleged layer 25 is a metal nitride single crystal layer (column 5, lines 49-51). This is different from, and fails to teach or suggest, "*a third layer comprising a GaN system epitaxial layer grown on the second layer,*" (emphasis added by

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Applicants) as recited in claim 6, and similarly recited in claim 8. Thus, Itoh fails to satisfy the plain meaning of claim language.

Furthermore, Applicants submit that in the claimed invention, the GaON layer is formed between the Ga<sub>2</sub>O<sub>3</sub> substrate and the GaN layer, when the substrate is nitride. However, according to Itoh, the nitriding is implemented after depositing an Al single layer 24 on a sapphire substrate 22, as depicted in Figs. 8A to 8C of Itoh. Thus, Itoh fails to teach or suggest the claimed invention.

Moreover, referring to Fig. A attached hereto as Exhibit 1, when a device having a structure of the claimed invention is fabricated using Itoh's method, the structure of the device is completely different from the structure of the claimed invention. Additionally, the device structure of the claimed invention cannot be fabricated by the alleged method of Itoh. Thus, Itoh fails to teach or suggest the claimed invention.

Therefore, Applicants respectfully submit that Itoh fails to teach or suggest each element of Applicant's claimed invention. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

Moreover, in rejecting claims 7, 9, 10, 12, 15-18, and 20, the Examiner alleges that one of ordinary skill in the art would have combined Itoh with Ota to render obvious the claimed invention. Applicants respectfully submit, however, that the references would not have been combined as alleged by the Examiner and that, even if combined, the alleged combination of references would not teach or suggest each and every feature of the claimed invention.

Applicants respectfully traverse this rejection, at least because Ota is not cited as remedying the aforementioned deficiencies of Itoh.

Indeed, Ota is merely cited for allegedly disclosing a  $\beta$ -Ga<sub>2</sub>O<sub>3</sub>. Thus, claims 7, 9, 10, 12, 15-18, and 20 are allowable for at least the same reasons that the underlying base claims are allowable.

Moreover, Applicants respectfully submit that these references are unrelated and would not have been combined as alleged by the Examiner. Thus, no person of ordinary skill in the art would have considered combining these disparate references, absent impermissible hindsight.

Further, Applicants submit that there is no motivation or suggestion in the references to urge the combination as alleged by the Examiner. Indeed, these references clearly do not

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teach or suggest their combination. Therefore, Applicants respectfully submit that one of ordinary skill in the art would not have been so motivated to combine the references as alleged by the Examiner. Therefore, the Examiner has failed to make a prima facie case of obviousness.

Therefore, Applicants respectfully submit that one with ordinary skill in the art would not have combined Itoh with the teachings of Ota, and even if combined, the alleged combination does not teach or suggest (or render obvious) each and every feature of the claimed invention. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

Moreover, in rejecting claims 11 and 13, the Examiner alleges that one of ordinary skill in the art would have combined Itoh with Braddock to render obvious the claimed invention. Applicants respectfully submit, however, that the references would not have been combined as alleged by the Examiner and that, even if combined, the alleged combination of references would not teach or suggest each and every feature of the claimed invention.

Applicants respectfully traverse this rejection, at least because Braddock is not cited as remedying the aforementioned deficiencies of Itoh.

Indeed, Braddock is merely cited for allegedly disclosing  $(\text{In}_x\text{Ga}_{1-x})_2\text{O}_3$ . Thus, claims 11 and 13 are allowable for at least the same reasons that the underlying base claim is allowable.

Moreover, Applicants respectfully submit that these references are unrelated and would not have been combined as alleged by the Examiner. Thus, no person of ordinary skill in the art would have considered combining these disparate references, absent impermissible hindsight.

Further, Applicants submit that there is no motivation or suggestion in the references to urge the combination as alleged by the Examiner. Indeed, these references clearly do not teach or suggest their combination. Therefore, Applicants respectfully submit that one of ordinary skill in the art would not have been so motivated to combine the references as alleged by the Examiner. Therefore, the Examiner has failed to make a prima facie case of obviousness.

Therefore, Applicants respectfully submit that one with ordinary skill in the art would not have combined Itoh with the teachings of Braddock, and even if combined, the alleged combination does not teach or suggest (or render obvious) each and every feature of the

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claimed invention. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

### III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicants submit that claims 1, 2, and 4-21, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Date: 07.16.09

Respectfully Submitted,

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**FACSIMILE TRANSMISSION**

I hereby certify that I am filing this paper via facsimile, to Group Art Unit 2814, at  
(571) 273-8300, on July 17, 2009.

Respectfully Submitted,

Date: 07.16.09

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